



1. Brief introduction of the FRP pipes

The basic characteristics of FRP pipes

1) Good physical mechanic characteristic

The density of the FRP pipes is 1.6-1.9g/cm³, which are about 1/4-1/5 of that of the steel pipes. The weight of the FRP pipes is not more than 1/3 of that of the steel pipes of the same specification. Its thermal expansion coefficient is about the same with the steel, but its heat conduction coefficient is only 0.5% of the steel, so it's a kind of good thermal and electricity insulation material.

2) Corrosion resistance and long service life

FRP have special corrosion resistance, so the FRP pipes is suitable for transferring acid, alkali, salt and organic solvent etc.

3) Good hydraulic characteristic

FRP pipes have good hydraulic characteristic, so it has little fluid pressure loss. By choosing the pipes of small diameter or delivery pump of small efficiency, we can reduce the investment and the running cost.

The inside wall of the FRP pipes is very smooth, its roughness is about 0.008, can be regarded as hydraulics smooth pipes. During the transferring process, the inside wall of the steel, cast-iron and cement pipes often is corroded, and become rougher and rougher, but the FRP pipes can always has a smooth inside wall.

4) Low installation and maintenance cost

Generally speaking, FRP pipes don't need special anticorrosion treatment; the thickness of the heat insulation layer can be reduced, even it doesn't need special heat insulation treatment; it has lightweight, so it can reduce the cost of transportation; the length of FRP pipe is longer than steel, cast-iron and cement pipe, which reduces the quantity of joint. All of the above advantages can reduce the installation and maintenance cost, which has been proved by the clients from china and abroad.

5) Flexible to design, easy to change the form

FRP pipe is produced with fiberglass dipped in resin through special winding and solidifying process. The wall of the pipe is in the sandwich form, so we can change the physical and chemical characteristics through changing the resin or the fiberglass used for the pipes. So easy to change the form is a unique advantage of FRP pipes.

FRP pipe's diameter comply with steel pipe

Steel pipe (With cement mortar inside)	FRP pipe	Steel pipe (With cement mortar inside)	FRP pipe
DN350	DN300	DN1300	DN1200
DN500	DN350	DN1400	DN1200
DN600	DN500	DN1500	DN1300



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DN700	DN600	DN1600	DN1400
DN800	DN700	DN1800	DN1600
DN900	DN800	DN2000	DN1700
DN1000	DN900	DN2200	DN1900
DN1100	DN1000	DN2400	DN2100
DN1200	DN1100	DN2500	DN2200

The roughness of all kinds of pipes

Material	Absolute Roughness
Steel pipe	0.08-0.39
Cast iron pipe	0.25
Cement pipe	0.33
Old rust steel pipe	0.60
FRP pipe	0.0053



管道厚度参数 Pipe

DN (mm)	L (mm)	A (mm)	0.6MPa	1.0MPa	1.6MPa
			TH(mm)	TH(mm)	TH(mm)
10	1800	1500	4.6	4.6	4.6
15	1800	1500	4.6	4.6	4.6
20	1800	1500	4.6	4.6	4.6
25	1800	1500	4.6	4.6	4.6
32	1800	1500	4.6	4.6	4.6
40	1800	1500	4.6	4.6	4.6
50	6000	2000	4.6	4.6	4.6
65	6000	2000	4.6	4.6	4.6
80	6000	2000	4.6	4.6	4.6
100	6000	2000	4.6	4.6	4.6
125	6000	3000	4.6	4.6	5.9
150	6000	3000	4.6	4.6	5.9
200	12000	3000	4.6	5.9	7.2
250	12000	4000	4.6	5.9	8.5
300	12000	4000	5.9	7.2	9.8
350	12000	4000	5.9	8.5	11.1
400	12000	4000	5.9	9.8	12.4
450	12000	4000	7.2	9.8	13.7
500	12000	4000	7.2	9.8	15.0
600	12000	6000	8.5	12.4	17.6
700	12000	6000	9.8	13.7	20.2
800	12000	6000	9.8	15.0	22.8
900	12000	6000	11.1	16.3	25.4
1000	12000	6000	12.4	17.3	28.0
1200	12000	6000	13.7		
1400	12000	6000	16.3		
1500	12000	6000	16.3		
1600	12000	6000	17.6		
1800	12000	6000	18.9		
2000	12000	6000	21.5		
2100	12000	6000	22.8		
2200	12000	6000	24.1		
2400	12000	6000	25.4		
2600	12000	6000	26.7		
3000	12000	6000	30.6		
3300	12000	6000	33.2		
3600	12000	6000	35.8		
4000	12000	6000	39.7		

The types of FRP pipes classified according to the using field

- 1) Chemical material transferring pipes
- 2) Technology pipe line (chemical technology, paper technology, sewage water treatment, food and drinks processing, medicine technology etc)
- 3) Pressure pipe used for minitype hydroelectric station, recycling pipes for power plant



- 4) Sewage water transferring pipe
- 5) Potable water transferring pipe
- 6) Oil transferring pipe
- 7) Seawater transferring pipe
- 8) Pipes used for irrigation in agriculture
- 9) FRP plants (ventilation and air conditioner, chimney, washer etc)

The types of FRP pipes classified according to the working pressure

1) Pressure pipe (0.6Mpa-2.5Mpa)

2) Gravity flow pipes (<0.6Mpa)

3) Vacuum pipe, external pressure pipe and siphon pipe

The working pressure of the FRP pipes is about 0.6 Mpa -2.5 Mpa, some special ones can reach 7.5 Mpa.

4) Stiffness: 2500,5000,10000

FRP pipes with sand filler

FRP pipes with sand filler are mainly used for pipes underground, it has many advantages such as lightweight, corrosion resistance, long service life, low installation and maintenance cost.

1) The main technology

Computer controls the whole process, first it will wind the inner liner through the same winding process, and then wind the mixture of sand and resin in the structure layer, at last wind the external layer.

2) The raw material

Resin, chopped fiberglass, continuous fiberglass, sand and other materials.

3) Specifications

Diameter: 300-3000mm; length: 6m, 10m, and 12m.

Other specifications can be ordered according to the customer.

Fittings: elbows, tees, flanges, Y or T joints, reducers etc.

4) Manufacturing and inspection standard

We strictly comply with the international standard AWWA-C950, ASTM D2996, ISO9002, and the national building industry standard of JC/T838-1998.

Inspection: we have the inspection certification of the raw material from the manufactures. In order to guarantee the quality of the pipes we test the raw material before they are used.

5) Physical mechanics characteristic

Before the pipes are out of factory, each technique index of the pipe must be inspected according to the related standard, such as the barcol hardness test, eyeballing, stiffness etc.

Pipe Fittings



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Tees, flange, Y type joint, T type joint, reducers etc.

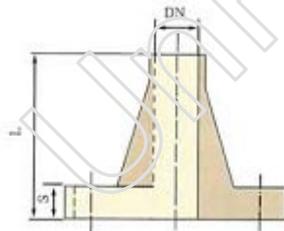
1.Characteristics of FRP Pipes

- 1.Good corrosion-resistant
 - 2.Lightweight and high strength
 - 3.Installation conveniently
 - 4.Smooth inner surface has good property of circulation
 - 5.Good low temperature-resistant
 - 6.Good thermal insulation
- Used in chemical industry and other field of acid resistant or alkali resistant

2.Specification of FRP pipe and fittings

法 兰 Flange

DN (mm)	0.6MPa		1.0MPa		1.6MPa	
	S(mm)	L(mm)	S(mm)	L(mm)	S(mm)	L(mm)
10	12	100	15	100	15	100
15	12	100	15	100	15	100
20	12	100	15	100	18	100
25	12	100	18	100	20	100
32	15	100	18	100	22	100
40	15	100	20	100	25	100
50	15	100	22	100	28	150
65	18	100	25	150	30	160
80	18	150	28	160	32	200
100	20	150	28	180	35	250
125	22	200	30	230	38	300
150	25	200	32	280	42	370
200	28	220	35	360	52	500
250	30	280	45	420	56	620
300	40	300	52	500		
350	45	400	60	570		
400	50	420				
450	50	480				
500	50	540				
600	50	640				

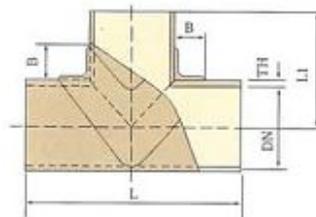


三通 Tee

DN (mm)	P=0.6MPa			P=1.0MPa			P=1.6MPa		
	TH	L=2L ₁	B	TH	L=2L ₁	B	TH	L=2L ₁	B
10	5.5	300	50	5.5	300	50	5.5	300	50
15	5.5	300	50	5.5	300	50	5.5	300	50
20	5.5	300	50	5.5	300	50	5.5	300	50
25	5.5	300	50	5.5	300	50	5.5	300	50
32	5.5	300	50	5.5	300	50	5.5	300	50
40	5.5	300	50	5.5	300	50	5.5	300	50
50	5.5	400	50	5.5	400	50	5.5	400	50
65	5.5	400	50	5.5	400	50	5.5	400	50
80	5.5	400	50	5.5	400	50	5.5	480	60
100	5.5	400	50	5.5	420	50	9.4	580	80
125	5.5	400	50	5.5	540	80	9.4	720	100
150	5.5	480	60	9.4	640	100	10.3	840	120
200	7.1	600	80	9.8	820	120	12.9	1100	150
250	9.4	740	100	13.3	930	150	15.2	1420	210
300	9.4	840	100	13.3	1180	150	17.3	1680	240
350	9.4	1000	170	15.8	1380	180	19.6	1940	270
400	10.6	1100	120	16.8	1580	210	23.8	2200	300
450	13	1260	150	18.3	1720	210	26.2	2500	360
500	13.7	1320	150	18.9	1940	250	26.2	2800	400
600	16.2	1340	180	22.7	2320	300	27.6	3280	450
700	16.6	1900	210	24.5	2660	330	37.2	3880	550
800	19.6	2120	240	28.3	3100	400	43.8	4360	600
900	20	2440	270	30	3400	420	48.3	5000	700
1000	22.9	2720	300	33.2	3860	500	52.6	5460	750

注: 连接方式可与管道相适应任意选取。

Note: The type of joint can be selected in accordance with the pipes.





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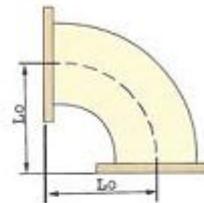
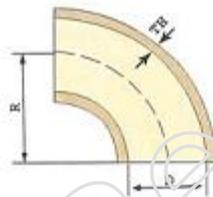
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弯头 Elbow

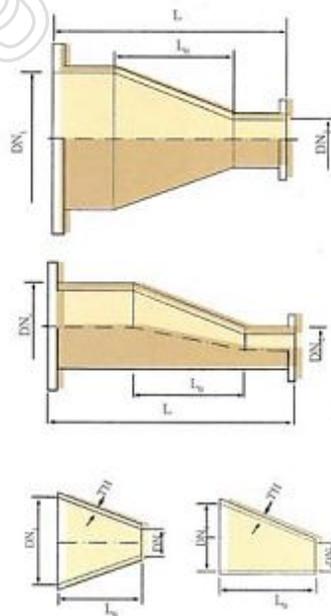
DN (mm)	R (mm)	0.6MPa	1.0MPa	1.6MPa
		TH(mm)	TH(mm)	TH(mm)
10	15	5.5	5.5	5.5
15	22.5	5.5	5.5	5.5
20	30	5.5	5.5	5.5
25	37.5	5.5	5.5	5.5
32	48	5.5	5.5	5.5
40	60	5.5	5.5	5.5
50	75	5.5	5.5	5.5
65	97.5	5.5	5.5	5.5
80	120	5.5	5.5	5.5
100	150	5.5	5.5	9.4
125	187.5	5.5	5.5	9.4
150	225	5.5	9.4	10.9
200	300	7.1	9.8	12.9
250	375	9.4	10.4	15.2
300	450	9.4	13.3	17.3
350	525	9.8	15.8	19.6
400	600	10.6	16.8	23.8
450	675	13	18.3	26.2
500	750	13.7	18.9	26.2
600	900	16.2	22.7	27.6
700	1050	18.6	24.5	27.2
800	1200	18.6	28.3	43.8
900	1350	20	30.2	26.2
1000	1500	22.9	33.2	26.6





变径管 Reducer

D1 (mm)	D2 (mm)	L0 (mm)	0.6MPa TH(mm)	1.0MPa L1(mm)	1.6MPa TH(mm)
15	10	37.5	5.5	5.5	5.5
20	15	37.5	5.5	5.5	5.5
25	20	37.5	5.5	5.5	5.5
32	25	37.5	5.5	5.5	5.5
40	32	37.5	5.5	5.5	5.5
50	40	37.5	5.5	5.5	5.5
65	50	37.5	5.5	5.5	5.5
80	65	37.5	5.5	5.5	5.5
100	80	50	5.5	5.5	9.4
125	100	62.5	5.5	5.5	9.4
150	125	62.5	5.5	9.4	10.9
200	100	250	7.1	9.8	12.9
200	150	125	7.1	9.8	12.9
250	200	125	9.4	10.4	15.2
300	200	250	9.4	13.3	17.3
300	250	125	9.4	13.3	17.3
350	300	125	9.8	15.8	19.6
400	300	250	10.6	16.8	23.8
400	350	125	10.6	16.8	23.8
450	400	125	13	18.3	26.2
500	400	250	13.7	18.9	26.2
500	450	125	13.7	19.9	26.2
600	500	250	16.2	22.7	27.6
700	600	250	18.6	24.5	37.2
900	800	250	20	33	48.3
1000	900	250	22.9	33.2	52.6



The storage and transportation of the pipes

- 1) There must be distance between the pipes, and we put timber between pipes, the height of the pipes is not more than 2 m. Pipes of smaller diameters can



be put into the bigger ones.

- 2) There shouldn't be any damage to the pipes when transportation.
- 3) The ground for putting the pipes must be flat; the stacking height is not more than 2m. They should be put in the place far from the fire, and they should not be placed in the open air for a long time.

The installation of the pipes

There are three kinds of installation methods: overhead pipeline, ground pipes and underground pipeline

1) The installation of the overhead pipes

The supporting of the FRP pipes is different from the steel pipes; so much attention must be paid to it.

The tensile module of FRP pipes is lower, in order to guarantee no deformation, we choose the suitable supporting distance. In order to avoid the concentration of stress, we use the broad bracket to support the pipes. We design the supporting point nearer to the joints in order to reduce the stress and design special supporting for the valves. Another problem is the supporting of the pipes depended wholly on the brackets, so the brackets must be stable. For the long pipes, in order to avoid the breaking of the pipes due to the thermal expansion, the position of the supporting points must be suitable. Generally speaking, the FRP pipes don't need expansion joints.

2) The burying of the underground pipes

The digging of the channel, backfilling of the soils and so on, all of the processes must comply with the technical requirements of the installation of the FRP pipes.

In order to reduce the working capacity, for the more difficult connecting of the joints, we generally finish them in the workshop.

After the installation, we often test the pipes through hydraulic test.



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